

# A new species of *Cerberilla* (Gastropoda: Nudibranchia: Aeolidiidae) from northeastern Brazil

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## ABSTRACT

Few specimens of the 15 named species of *Cerberilla* are known. Body color pattern and teeth morphology have been used as the main diagnostic characters to separate species of the genus. To date, *Cerberilla tanna* is the only species of the genus described from the western Atlantic. Because its original description does not provide much information about body coloration, the identity of this species remained unclear until now. In this paper, we describe *Cerberilla potiguara*, a new species from the northeastern coast of Brazil, and compare it with *C. tanna*. The holotype of *C. tanna* was located and examined. *Cerberilla potiguara* new species is longer than *C. tanna* but has relatively shorter oral tentacles and a narrower foot; the radular teeth of *Cerberilla potiguara* new species have prominent central and marginal cusps, which are absent in *C. tanna*. A prominent unarmed penis associated with a conical atrium, observed in *Cerberilla potiguara* new species and other *Cerberilla* species, is herein considered a distinguishing characteristic of the genus among the Aeolidiidae.

*Additional keywords:* Biodiversity, Opisthobranchia, Rio Grande do Norte, morphology, Marcus collection.

## INTRODUCTION

Because of their habit of burrowing in sand, few specimens are known of the 15 named species of *Cerberilla*. Body color pattern and teeth morphology have been used as the main diagnostic characters to separate the species (McDonald and Nybakken, 1975; Hermosillo and Valdés, 2007). In fact, body color and its patterns constitute an important character for taxonomic studies of nudibranchs in general (Behrens, 2005). Only recently the nudibranch fauna from the western Atlantic began to be well illustrated, with the publication of books containing color photographs of a series of species

(Redfern, 2001; Valdés et al., 2006; García-García et al., 2008). Previously, most western Atlantic species were known only from black-and-white ink drawings and generally brief descriptions of color (e.g. Marcus, 1955, 1957). In addition, some original descriptions of western Atlantic species were based on preserved and faded specimens (e.g. *Nanuca sebastiani* Marcus, 1957), the color of original living forms remained unknown.

The only named species of *Cerberilla* known from the western Atlantic is *Cerberilla tanna* Marcus and Marcus, 1960 described from a single preserved specimen from Texas, USA. The only mention of body color in the original description was of the presence of an “orange-brown spot on the outer surface of many, not all, cerata” on the dirty-yellow preserved holotype (Marcus and Marcus, 1960). Since the original description, new specimens of *C. tanna* have not been studied and this species remained for a long time as the only known representative of the genus in the western Atlantic. Humann and Deloach (2002) illustrated a brilliant blue *Cerberilla* from St. Vincent Island, called *Cerberilla* sp., in their book on reef creatures. This morphotype was also photographed in Florida, Bahamas, and Bonaire (Behrens, 2003; Hutchinson, 2003; Ferretti, 2009). Later, a pale-cream *Cerberilla* was recorded in the Gulf of Mexico (Hooper, 2004) and subsequently photographed from the coast of Mississippi and St. Vincent Island (Perry, 2005; Wilk, 2005). Another pale-cream morphotype, from Florida, was illustrated by Ianniello (2003) and Valdés et al. (2006: 276–277, as *C. tanna*). These pale-cream morphotypes have cerata with dark spots, more closely resembling the characteristics of *C. tanna*. However, the identity of all morphotypes, the brilliant blue and the two pale-cream forms, remained unclear because no data on their anatomy were available.

Material of the blue *Cerberilla*, recently collected on the northeastern coast of Brazil, is described herein. We compare it with the type material and the original description of *C. tanna*. A new species is described, and the situation of the genus in the western Atlantic is, at least in part, clarified.

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## MATERIALS AND METHODS

The holotype of *Cerberilla tanna* new species was located in the Marcus collection, deposited in the Malacological collection of the Museu de Zoologia da Universidade de São Paulo (MZSP), Brazil. Living material of the new species was photographed *in situ*, manually collected, fixed with 4% formalin, and preserved in 70% ethanol. It was deposited in the Malacological collection of the Museu Nacional/Universidade Federal do Rio de Janeiro (MNRJ), Brazil. Specimens were observed using a binocular microscope. External structures of interest were photographed using a Nikon digital camera coupled to the microscope. Material of the new species was dissected through a dorsal incision. The buccal mass was removed and placed in 10% sodium hydroxide until the jaws and radula were isolated from the adjacent tissue. The jaws and radula were then rinsed in water, dried, and mounted for examination with a scanning electron microscope (SEM). The reproductive system was drawn using the camera lucida mounted on the binocular microscope. The holotype of *C. tanna*, previously dissected, was photographed, but, in order to preserve its morphology, no new cuts or dissections were made.

## SYSTEMATICS

Family Aeolidiidae Gray, 1827  
Genus *Cerberilla* Bergh, 1873

*Cerberilla potiguara* new species  
(Figures 1–6, 10)

*Cerberilla* sp. Humann and Deloach, 2002: 309; Valdés et al. 2006: 276–277.

*Cerberilla* sp. 7.—Rudman, 2004.

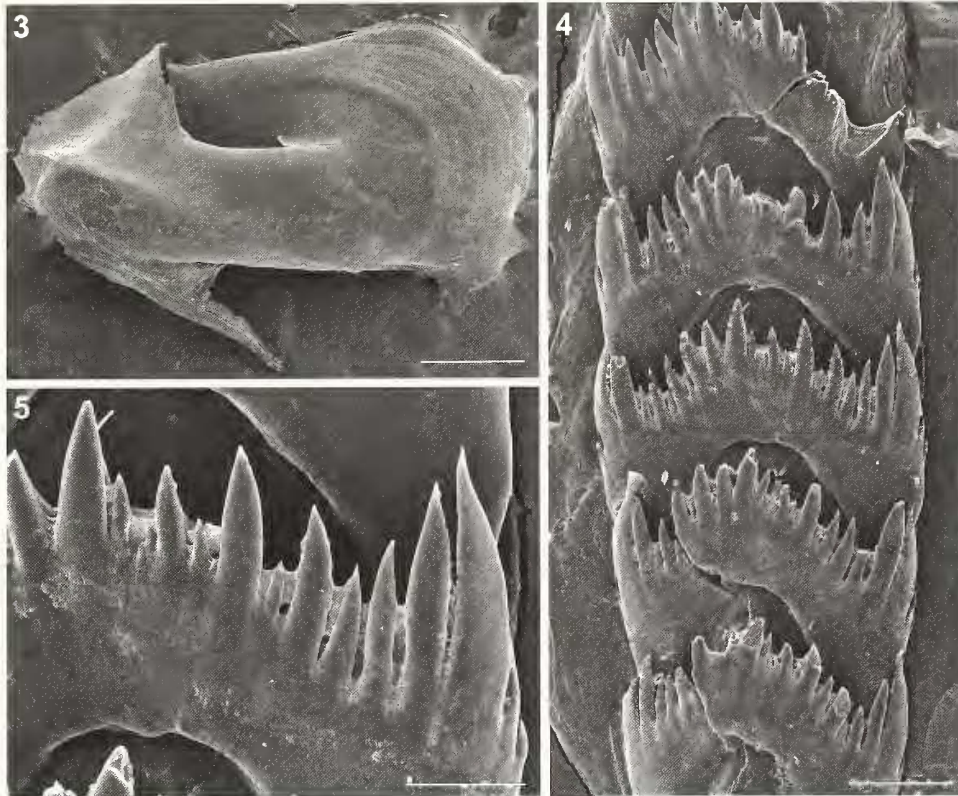
*Cerberilla tanna*.—Behrens, 2003.

**External Morphology (Figures 1, 2, 10):** Living holotype 45 mm long (18 mm long preserved). Body long, narrow. Distinct head, cylindrical oral tentacles and rhinophores. Pair of rounded, slightly protruded lips. Oral tentacles relatively short (3 mm long, preserved), projected laterally. Rhinophores short, smooth, with adjacent bases. Small eyes located at base of each rhinophore, laterally on head. Foot wider than body, with triangular anterior corners; anterior margin broader, tapers slightly, rounded posterior end. Cerata club-shaped, 15 rows, anterior rows more spaced; posterior cerata longer (8 mm long, preserved) covering dorsum. Gonopore, body right side, below first row of cerata. Anal and renal openings, body right side, behind pericardium, between fifth and sixth cerata rows.

**Coloration (Figures 1, 2):** Body brilliant blue. Upper oral region with orange line bordered in yellow, extended to inner area of each oral tentacle base. Oral tentacles blue. Oral lips light blue. Foot anterior margin yellow bordered. Rhinophores blue. Eyes region less pigmented. Head with remarkable pattern: thin triangular orange spot in front of each rhinophore; black line borders external side of each triangular spot, runs toward pericardium and behind rhinophores, where borders elliptical orange spot. Pericardial zone grayish black. Cerata grayish-blue, anterior portion with round yellow-



**Figures 1–2.** *Cerberilla potiguara* new species, living holotype (MNRJ 15111, length: 45 mm). 1. Specimen crawling near reef. 2. Detail of structures of the anterior region of the body. Abbreviations: **fc**, foot corner; **li**, lips; **ot**, oral tentacle; **rh**, rhinophore. Photo: Liana Mendes.



**Figures 3–4.** *Cerberilla potiguara* new species, holotype (MNRJ 15111), scanning electron micrographs. **3.** Left jaw, external face. Scale bar = 500  $\mu\text{m}$ . **4.** Radular teeth, general view. Scale bar = 100  $\mu\text{m}$ . **5.** Detail of the denticles of the eighth tooth. Scale bar = 50  $\mu\text{m}$ .

orange spot; spot longer on anterior cerata; posterior cerata with spot located near apical zone.

**Radula and Jaw (Figures 3–5):** Uniseriate radula, 19 teeth (holotype, 45 mm long alive). Radular teeth large, many times as wide as long. Tooth with series of denticles of different sizes (around 25 per tooth), submarginals highest; in some teeth, each short denticle alternates with high denticle; sequence of up to three high denticles located near central region of tooth. Jaw plates wide, rounded, slightly larger in posterior region; smooth projecting masticatory border.

**Reproductive System (Figure 6):** Hermaphroditic duct long, narrow. Ampulla very long, flattened, with four folds proximally; distal portion narrow, connected to prostate as well as to common atrium with vagina and receptaculum seminis insertion. Receptaculum seminis heart-shaped, projecting in a thin tube. Prostate voluminous, curved. Deferent duct large, curved. Penis large, unarmed. Male atrium conical, with small oval aperture.

**Holotype:** MNRJ 15111, Liana Mendes and Aline S. Martinez col., 14 Nov. 2008.

**Type Locality:** Praia de Búzios, Rio Grande do Norte, northeastern coast of Brazil (06° 00' 13" S; 35° 06' 24" W), intertidal zone of the coastal reef.

**Etymology:** The specific name refers to the Potiguar native Brazilian people, who inhabited the region of Rio Grande do Norte, Brazil.

**Geographic Distribution:** Known from type locality, Florida, the Bahamas, St. Vincent and the Grenadines, and Bonaire (Humann and Deloach, 2002; Behrens, 2003; Rudman, 2004; Valdés et al. 2006).

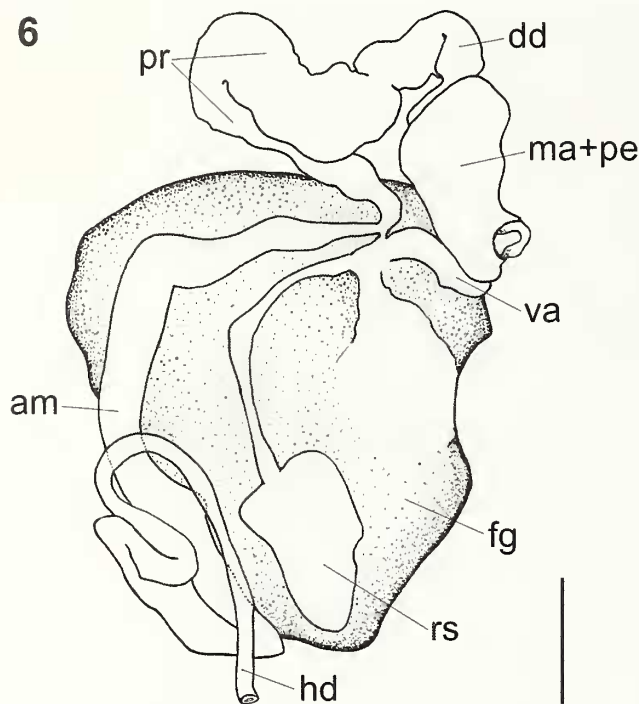
*Cerberilla tanna* Marcus and Marcus, 1960 (Figures 7–9)

*Cerberilla tanna* Marcus and Marcus, 1960: 259, figures 18–19.

?*Cerberilla tanna*.—Hooper, 2004; Perry, 2005; Wilk, 2005.

?*Cerberilla tanna*.—Ianiello, 2003; Valdés et al., 2006: 276.

**External Morphology (Figures 7–9):** Strongly contracted and curved holotype, 14 mm long. Body long, narrow. Distinct head with cylindrical oral tentacles and rhinophores. Oral region with marginal, grooved lip. Oral tentacles long (5 mm), projecting laterally. Rhinophores very short, smooth, with adjacent bases. Foot wider than body, oval shape, central region larger than the rest, triangular anterior corners. Cerata club-shaped, 13 closely set rows; anterior rows more spaced; posterior cerata longer (5 mm long, preserved) covering



**Figure 6.** *Cerberilla potiguara* new species, holotype (MNRJ 15111), reproductive system. Scale bar = 1 mm. Abbreviations: **am**, ampulla; **dd**, deferent duct; **fg**, female gland; **hd**, hermaphroditic duct; **ma**, male atrium; **pe**, penis; **pr**, prostate; **rs**, receptaculum seminis; **va**, vagina.

dorsum. Gonopore on right side, below third row of cerata. Anal and renal openings on right side, behind pericardium, under sixth row of cerata. Left side of body of holotype with a cut, made previously, from head to middle region.

**Coloration:** Body pale yellowish. Some cerata with orange-brown spot located on outer surface, under cnidosac. Cnidosacs whitish and translucent.

**Radula and Jaw:** Unfortunately, no digestive or reproductive structures were found upon examination of the holotype of *C. tanna*. For description of jaws and radula, see Marcus and Marcus (1960: 259).

**Material Examined:** Holotype (with the original label). Off Sabine Jetties, Texas, 15 June 1951, 3.6–12 m, Hildebrand col. (MZSP 75244).

**Geographic Distribution:** Known from Texas, Gulf of Mexico (type locality). The range of this species may include the coast of Mississippi, Florida, St. Vincent and the Grenadines Islands (Ianicillo, 2003; Hooper, 2004; Perry, 2005; Wilk, 2005; Valdés et al., 2006).

## DISCUSSION

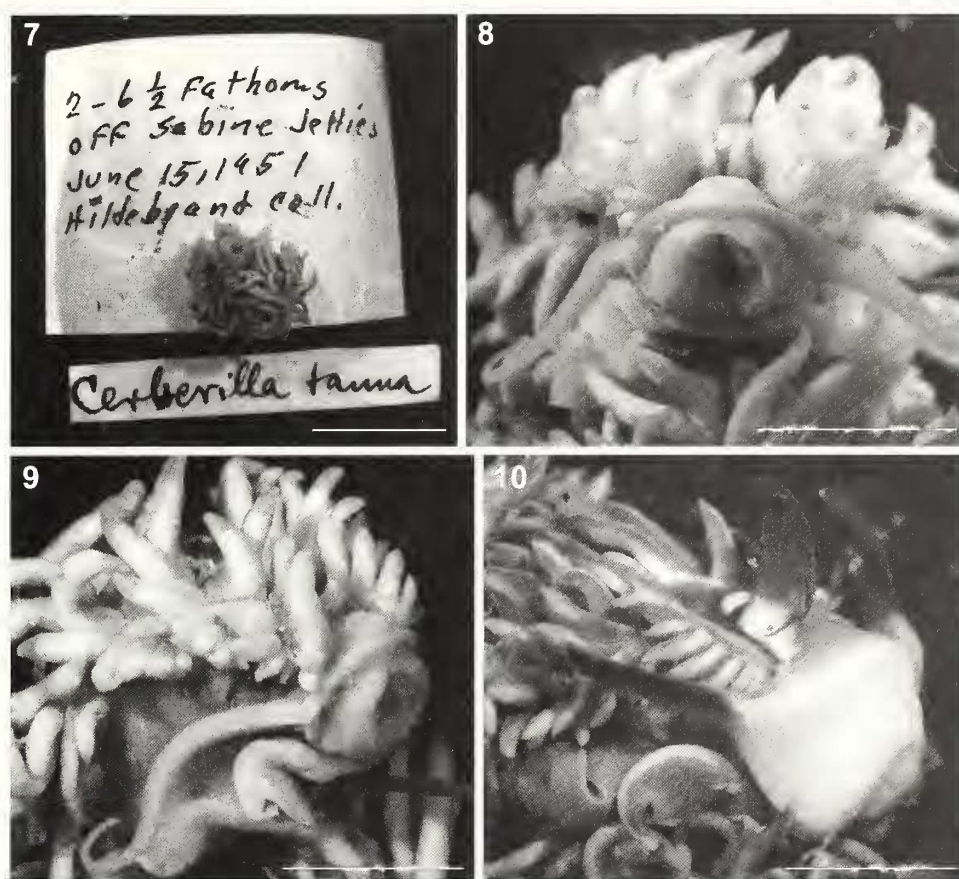
*Cerberilla potiguara* new species is included in the genus by having large, strong and pectinate radular teeth with high marginal denticles; foot wider than the

body with distinct tentaculiform anterior corners; small, cylindrical, smooth rhinophores; and penis large and unarmed, according to the definitions given by Bergh (1873), Burn (1966), and McDonald and Nybakken (1975). The last characteristic (penis large and unarmed) was reported originally by Bergh (1873) but was not discussed in subsequent studies.

The characteristics herein observed in the holotype of *Cerberilla tanna* agree with the original description of Marcus and Marcus (1960), including the very short rhinophores, long oral tentacles (around 1/3 of the preserved body length) and the orange-brown spot on the outer face of some cerata. These characteristics contrast with the morphology and coloration of *Cerberilla potiguara* new species, which has longer rhinophores, shorter oral tentacles (around 1/6 of the preserved body length) and a light spot on the outer face of each dark cerata (see Figures 8–10). *Cerberilla potiguara* new species has a longer body with a relatively narrower foot when compared to *C. tanna*, which has an oval foot. Although only one specimen of each species was available for study, remarkable differences could be observed in relation to their internal morphology. The radular teeth of *Cerberilla potiguara* new species have long and short, irregularly arranged denticles, with a sequence of high submarginal and up to three high central denticles. In contrast, the teeth of *C. tanna* have a sequence of alternating short and high denticles, with one to three small denticles between high denticles, and four to seven small denticles of different sizes in the center of the tooth, with the median denticles minute (Marcus and Marcus, 1960, Fig. 19).

Information on the reproductive system morphology is available for few species of *Cerberilla*: *C. affinis* Bergh, 1888; *C. ambonensis* Bergh, 1905; *C. bernadettae* Tardy, 1965; *C. chavezii* Hermosillo and Valdés, 2007; *C. longicirra* Bergh, 1873; and *C. moebii* (Bergh, 1888). No general characterization about the shape and organization of the reproductive structures exists for the genus. After checking previous descriptions and the morphology of *C. potiguara* new species, some characteristics shared among the species could be observed, including the presence of a large unarmed penis, associated in most cases with a conical atrium; a wide prostate and deferent duct; a small oval receptaculum seminis connected by a narrow tube, which is elongated in most species; and a long, convoluted ampulla. These characteristics are shared by *C. potiguara* new species, *C. affinis*, *C. bernadettae*, *C. chavezii*, and *C. moebii* (sec Bergh, 1888, 1888a; Tardy, 1965; Gosliner, 1985; Hermosillo and Valdés, 2007). For *C. ambonensis* and *C. longicirra*, only references to penis morphology exist, for the former relative to its length (2 mm; Bergh, 1905: 226) and for the latter to the penis length and shape: long and conical (Bergh, 1873: 28). The prominent unarmed penis associated with a conical atrium is herein considered a distinguishing characteristic of the genus *Cerberilla* among the Aeolidiidae.

The elucidation of the identity of the western Atlantic blue morphotype of *Cerberilla*, i.e., corresponding to the



**Figures 7–9.** *Cerberilla tanna*, preserved holotype (MZSP 75244), external morphology. **7.** Holotype and original labels. Scale bar = 10 mm. **8.** Frontal view of the oral region. Scale bar = 2.5 mm. **9.** Right side view of the anterior portion of the body. Scale bar = 2.5 mm. **10.** *Cerberilla potiguara* new species, preserved holotype (MNRJ 15111), right side view of the anterior portion of the body. Scale bar = 3 mm.

new species herein described, clarifies, at least in part, the situation of the genus in the western Atlantic. *Cerberilla tanna* resembles more the pale-cream morphotype from the Gulf of Mexico, Mississippi and St. Vincent (Hooper, 2004; Perry, 2005; Wilk, 2005) than the pale-cream morphotype from Florida (Ianiello, 2003; Valdés et al., 2006) because the former has short rhinophores and very long oral tentacles, as originally described and herein observed for the holotype of this species. Although it might be a different species, we do not discard the possibility that the material from Florida represents a juvenile color form of *Cerberilla potiguara* new species, as commented by Rudman (2003) and supported by the existence of other specimens with less blue pigmentation (Behrens, 2003; Ferretti, 2009; McVicar, 2009). The answers to this and other remaining questions about western Atlantic *Cerberilla* depend on more field observations and anatomical studies, when specimens become available.

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